# HFSS

# Perfectly Matched Layer Boundary Automation

*When analyzing radiating structures in an unbounded, infinite domain, ANSYS HFSS requires the truncation of the analysis domain and use of appropriate radiation boundary condition at the domain boundary to emulate the effect of an infinite domain (i.e. reflection free radiation). One radiation boundary condition is the Perfectly Matched Layer (PML). ANSYS HFSS simplifies both the creation and modification of PMLs allowing the analyst to efficiently create parameterized and accurate antenna models.*

### Introduction

PMLs are fictitious complex anisotropic materials that fully absorb the electromagnetic fields impinging upon them. PML objects are placed at the model boundary to emulate reflection free radiation.
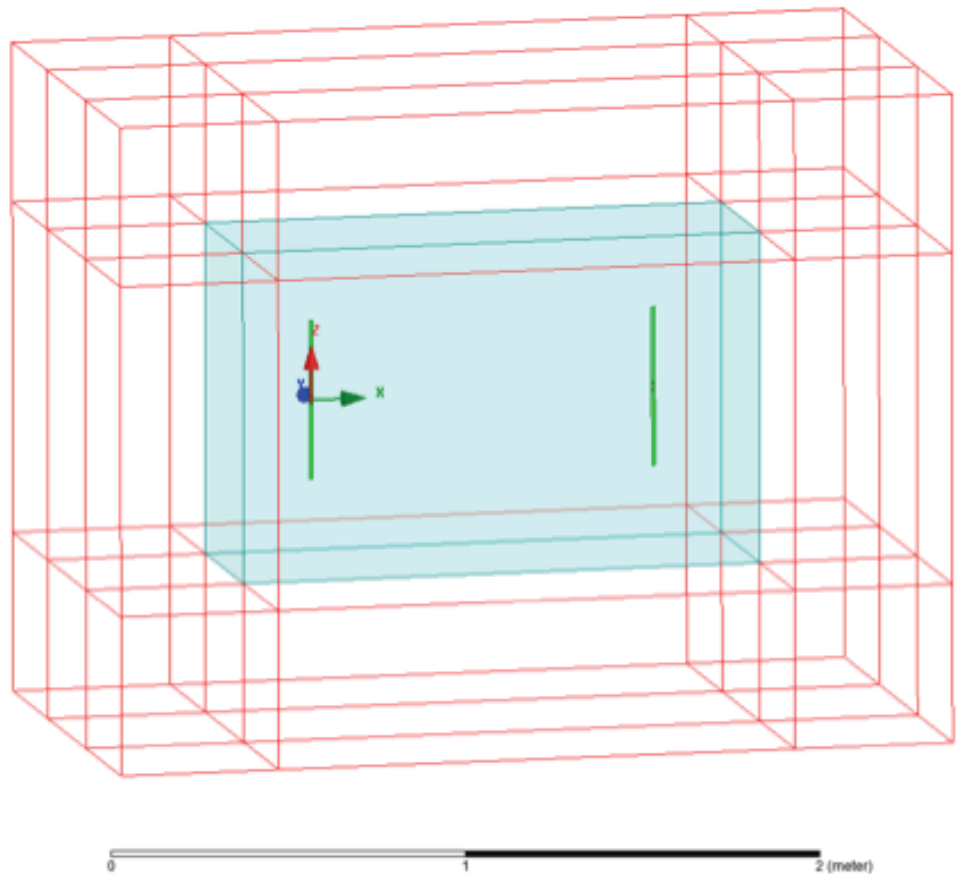


*Figure 1. Two dipoles in free space surrounded by PML objects.*

## Parameterized PML creation

Automated PMLs are created by drawing a Region object at the desired radiation surface, then using the PML setup wizard to automatically define the surrounding PML objects. When PML objects are drawn on the faces of a Region object, the PML objects automatically adjust to the size of the Region object.
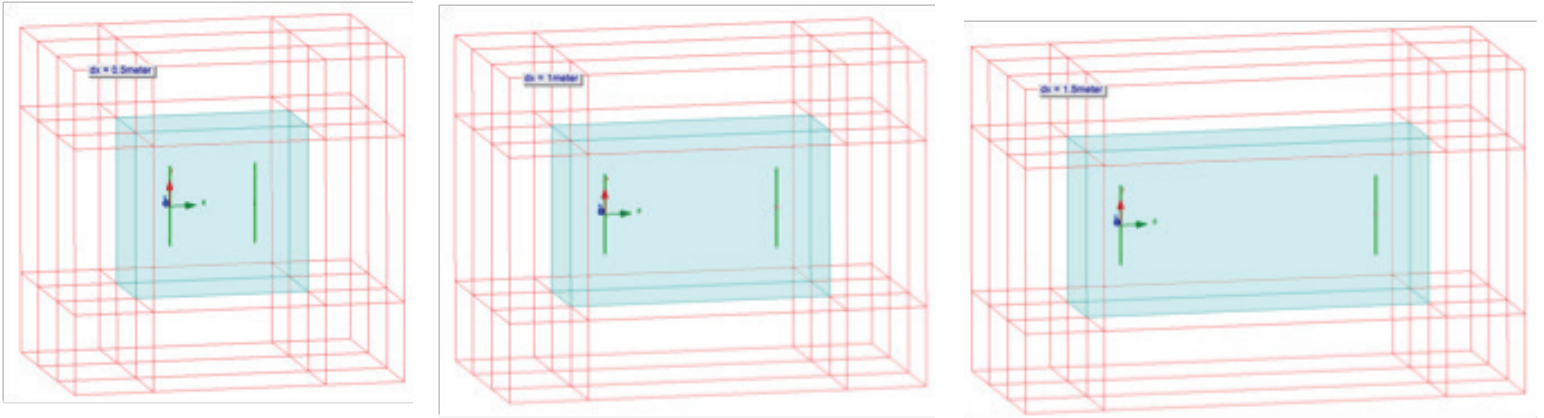


*Figure 2. Parameterized PMLs adjust to the model boundary.*

## Antenna Transmission Example

Consider the geometry shown in Figure 3. It is desired to perform a parametric analysis to determine the transmission $(S_{21})$ between two half wavelength dipoles as a function of the distance between the dipoles. With ANSYS HFSS, the distance between the dipoles, the size of the Region, and subsequently the location of the PML objects may be fully parameterized to efficiently perform the parametric analysis. With the automation of the PML boundary, when any of the model parameters are changed, the PML boundary changes automatically to conform to the appropriate distance away from the structure to emulate reflection free radiation.
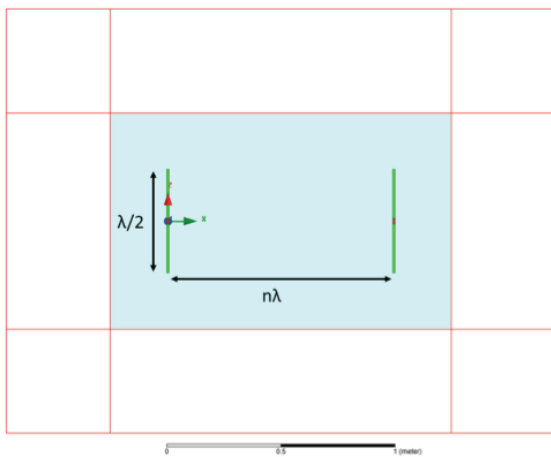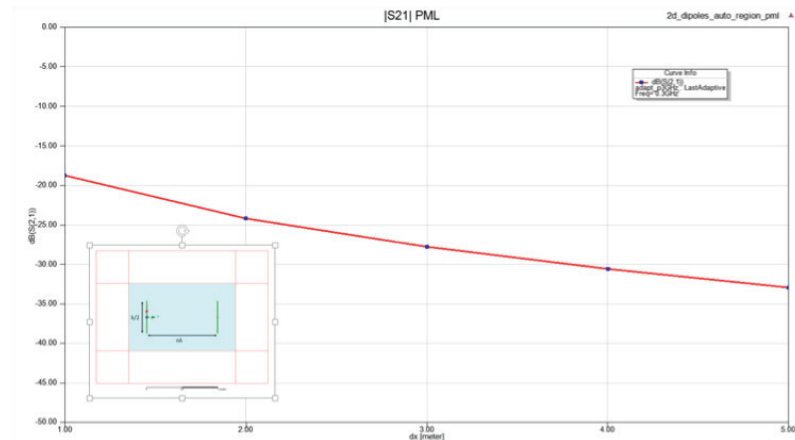


*Figure 3. Two half wave dipoles in free space.*



*Figure 4. $|S_{21}|$ of two half wavelength dipoles as a function of separation distance in wavelengths.*